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Hou(10) **Pub. No.: US 2015/0021681 A1**(43) **Pub. Date: Jan. 22, 2015**(54) **SEMICONDUCTOR DEVICE HAVING METAL GATE AND MANUFACTURING METHOD THEREOF**(71) Applicant: **UNITED MICROELECTRONICS CORP.**, Hsin-Chu City (TW)(72) Inventor: **Yong Tian Hou**, Singapore (SG)(21) Appl. No.: **13/943,721**(22) Filed: **Jul. 16, 2013****Publication Classification**(51) **Int. Cl.**
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(57)

ABSTRACT

A manufacturing method of a semiconductor device having metal gate includes providing a substrate having a first semiconductor device formed thereon, and the first semiconductor device includes a first dummy gate. Next, the dummy gate is removed to form a first gate trench in the first semiconductor device, and the substrate is exposed in a bottom of the first gate trench. Subsequently, an epitaxial channel layer is formed in the first gate trench.

